Exhibit 10

IEEE 100

The Authoritative Dictionary of
IEEE Standards Terms

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for transmission, or the effect of such departure on a transmitted signal. (PE) 599-1985w

(3) Instantaneous phase departure from a nominal phase.
(SCC27) 1139-1999

phase difference (general) The difference in phase between two sinusoidal functions having the same periods.
(Std100) 270-1966w

(2) (A) (automatic control) Between sinusoidal input and output of the same frequency, phase angle of the output minus phase angle of the input: it is called "phase lead" if the input angle is the smaller, "phase lag" if the larger. (B) (automatic control) Of two periodic phenomena (for example, in nonlinear systems) the difference between the phase angles of their two fundamental waveforms. *Note:* Regarded as part of the transfer function which relates output to input at a specified frequency, phase difference is simply the phase angle $\theta(j\omega)$ in $A(j\omega)$ exp $j\theta(j\omega)$. Measurement of phase difference in the complex case is sometimes made in terms of the angular interval between respective crossings of a mean reference line, but values so measured will generally differ from those made in terms of the fundamental waveforms. *See also:* phase shift.
(PE/EDPG) [3]

phase distance relay A distance relay designed to detect phase-to-phase and three-phase faults. (PE/PSR) C37.113-1999

phase distortion (1) (data transmission) Either the lack of direct proportionality of phase shift to frequency over the frequency range required for transmission, or the effect of such departure on a transmitted signal. (PE) 599-1985w

(2) (facsimile) *See also:* delay distortion; phase-frequency distortion. (C) 610.7-1995

phased satellite (communication satellite) A satellite, the center of mass of which is maintained in a desired relation relative to other satellites, to a point on earth or to some other point of reference such as the sub-solar point. *Note:* If it is necessary to identify those satellites that are not phased satellites, the term "unphased satellites" may be used.
(COM) [19]

phase-failure protection *See:* open-phase protection; phase-undervoltage protection.

phase-frequency distortion (facsimile) Distortion due to lack of direct proportionality of phase shift to frequency over the frequency range required for transmission. *Notes:* 1. Delay distortion is a special case. 2. This definition includes the case of a linear phase-frequency relation with the zero frequency intercept differing from an integral multiple of p. *See also:* phase delay distortion; phase distortion; facsimile transmission; distortion. (COM) 168-1956w

phase function matrix The matrix that results when the elements of the Mueller matrix are averaged over all scatterer orientations. The phase function matrix relates the average scattered Stokes vector to the incident Stokes vector.
(AP/PROP) 211-1997

phase grouping The same phase of a number of circuit breaker' poles is grouped in an adjacent configuration along the line of the same row.
(SWG/SUB/PE) C37.122-1983s, C37.100-1992

phase hit or change A sudden change in the received signal phase (or frequency) lasting longer than 4 ms. Since two common modulation techniques for high-speed data transmission are phase and frequency modulation, phase hits cause errors by looking like data. *See also:* gain hit or change; dropouts.
(PE/IC) 1143-1994r

phase instability $(S_\phi(f))$ One-sided spectral density of the phase deviation. (SCC27) 1139-1999

phase-insulated terminal box (rotating machinery) A terminal box so designed that the protection of phase conductors against electric failure within the terminal box is by insulation only. (PE) [9]

phase jitter An instability in the phase of a transmission signal. *See also:* amplitude jitter. (C) 610.7-1995

phase lag (phase delay) (2-port network) The phase angle of the input wave relative to the output wave $(\phi_{in} - \phi_{out})$, or

the initial phase angle of the output wave relative to the final phase angle of the output wave $(\phi_i - \phi_f)$. *Note:* Under matched conditions, phase lag is the negative of the angle of the transmission coefficient of the scattering matrix for a 2-port network. *See also:* phase difference.
(IM) 285-1968w, [38]

phase localizer (navigation aid terms) A localizer in which the on-course line is defined by the phase reversal of energy radiated by the sideband antenna system, a reference carrier signal being radiated and used for the detection of phase.
(AES/GCS) 172-1983w

phase lock The state of synchronization between two ac signals in which they remain at the same frequency and with constant phase difference. This term is typically applied to a circuit that synchronizes a variable oscillator with an independent signal. (PE/PSR) 1344-1995

phase-locked Pertaining to two signals whose phases relative to each other are kept constant by a controlling device.
(C) 610.10-1994w

phase lock loop (communication satellite) A circuit for synchronizing a variable local oscillator with the phase of a transmitted signal. Widely used in space communication for coherent carrier tracking, and threshold extension, bit synchronization and symbol synchronization. (COM) [24]

phase locus (for a loop transfer function, say G(s) H(s) A plot in the *s* plane of those points for which the phase angle, ang *GH*, has some specified constant value. *Note:* The phase loci for 180 degrees plus or minus *n* 360 degrees are also root loci. *See also:* feedback control system. (PE/EDPG) [3]

phase margin (1) (loop transfer function for a stable feedback control system) (excitation systems) 180 degrees minus the absolute value of the loop phase angle at a frequency where the loop gain is unity. *Note:* Phase margin is a convenient way of expressing relative stability of a linear system under parameter changes, in Nyquist, Bode, or Nichols diagrams. In a conditionally stable feedback control system where the loop gain becomes unity at several frequencies, the term is understood to apply to the value of phase margin at the highest of these frequencies. *See also:* feedback control system. (PE/EDPG) 421A-1978s

(2) (speed governing of hydraulic turbines) 180 degrees minus the absolute value of the open-loop phase angle at a frequency where the open-loop gain is unity.
(PE/EDPG) 125-1977s

(3) The absolute value of loop phase angle subtracted from 180 degrees found in a feedback system at the frequency for which its gain reaches unity. The margin from 180 degrees represents a measure of dynamic stability.
(PEL) 1515-2000

phase meter (phase-angle meter) An instrument for measuring the difference in phase between two alternating quantities of the same frequency. *See also:* instrument. (EEC/PE) [119]

phase modifier (rotating machinery) An electric machine, the chief purpose of which is to supply leading or lagging reactive power to the system to which it is connected. Phase modifiers may be either synchronous or asynchronous. *See also:* converter. (IA/PE/MT) 45-1983s, [9]

phase-modulated transmitter A transmitter that transmits a phase-modulated wave.
(AP/BT/ANT) 145-1983s, 182-1961w

phase modulation (1) (data transmission) Angle modulation in which the angle of a carrier is caused to depart from its reference value by an amount proportional to the instantaneous value of the modulating function. *Notes:* 1. A wave phase modulated by a given function can be regarded as a wave frequency modulated by the time derivative of that function. 2. Combinations of phase and frequency modulation are commonly referred to as frequency modulation. *See also:* reactance modulator; angle or phase; pulse duration; phase deviation. (IT/AP/PE/ANT) 145-1983s, 599-1985w, [123]

(2) (overhead-power-line corona and radio noise) Modulation in which the angle of a carrier is caused to depart from

its reference value by an amount proportional to the instantaneous value of the modulating signal.

(T&D/PE) 539-1990

(3) A modulation technique in which a data signal is sent onto a fixed carrier frequency by modifying the phase of the carrier. (C) 610.7-1995

phase-modulation recording A type of magnetic recording in which each storage cell is divided into two regions that are each magnetized in opposite senses; the sequence of these senses indicates whether the binary character represented is zero or one. *See also:* double-pulse recording.

(C) 610.10-1994w

phase-modulation telemetering (electric power system) A type of telemetering in which the phase difference between the transmitted voltage and a reference voltage varies as a function of the magnitude of the measured quantity. *See also:* telemetering. (PE/PSE) 94-1970w

phase modulator, optical *See:* optical phase modulator.

phase nonlinearity The deviation in phase from a perfectly phase-linear response as a function of frequency. The phase response of a perfectly phase-linear system is directly proportional to frequency. (IM/WM&A) 1057-1989w

phase of a circularly polarized field vector In the plane of polarization, the angle that the field vector makes, at a time taken as the origin, with a reference direction and with the angle counted as positive if it is in the same direction as the sense of polarization and negative if it is in the opposite direction to the sense of polarization. (AP/ANT) 145-1993

phase overcurrent The current flowing in a phase conductor which exceeds a predetermined value.

(SWG/PE) C37.100-1981s

phase path (radio-wave propagation) For a monochromatic electromagnetic wave, the product of the phase constant and the physical path length. *Note:* In a slowly varying spatially inhomogeneous medium, the phase path length equals the line integral of the real part of the phase vector along the ray path. (AP/PROP) 211-1990s

phase path length For a monochromatic electromagnetic wave, the product of the phase constant and the physical path length. *Note:* In a slowly varying spatially inhomogeneous medium, the path length equals the line integral of the real part of the phase constant along the ray path. *See also:* electrical length. (AP/PROP) 211-1997

phase pattern (of an antenna) The spatial distribution of the relative phase of a field vector excited by an antenna. *Notes:* 1. The phase may be referred to any arbitrary reference. 2. The distribution of phase over any path, surface, or radiation pattern cut is also called a phase pattern.

(AP/ANT) 145-1993

phase recovery time (microwave gas tubes) The time required for a fired tube to deionize to such a level that a specified phase shift is produced in the low-level radio-frequency signal transmitted through the tube. *See also:* gas tube.

(ED) 161-1971w

phase, relative *See:* relative phase.

phase relay A relay that by its design or application is intended to respond primarily to phase conditions of the power system.

(SWG/PE) C37.100-1992

phase resolution The minimum change of phase that can be distinguished by a system. *See also:* measurement system.

(IM) [38]

phase-reversal protection *See:* phase-sequence reversal protection.

phase-reversals relay *See:* negative-phase-sequence relay.

phase-segregated terminal box A terminal box so designed that the protection of phase conductors against electric failure within the terminal box is by insulation, and additionally by grounded metallic barriers forming completely isolated individual phase compartments so as to restrict any electric breakdown to a ground fault. (PE) [9]

phase-selector relay A programming relay whose function is to select the faulted phase or phases, thereby controlling the operation of other relays or control devices.

(SWG/PE) C37.100-1992

phase-separated terminal box *See:* phase-segregated terminal box.

phase separator (rotating machinery) Additional insulation between adjacent coils that are in different phases. *See also:* stator; rotor. (PE) [9]

phase sequence (1) (set of polyphase voltages or currents) The order in which the successive members of the set reach their positive maximum values. *Note:* The phase sequence may be designated in several ways. If the set of polyphase voltages or currents is a symmetrical set, one method is to designate the phase sequence by specifying the integer that denotes the number of times that the angular phase lag between successive members of the set contains the characteristic angular phase difference for the number of phases m. If the integer is zero, the set is of zero phase sequence; if the integer is one, the set is of first phase sequence; and so on. Since angles of lag greater than $2p$ produce the same phase position for alternating quantities as the same angle decreased by the largest integral multiple of 2p contained in the angle of lag, it may be shown that there are only m distinct symmetrical sets normally designated from 0 to $m - 1$ phase sequence. It can be shown that only for the first phase sequence do all the members of the set reach their positive maximum in the order of identification at uniform intervals of time.

(PE) [9], 270-1966w

(2) (power and distribution transformers) The order in which the voltages successively reach their positive maximum values. *See also:* direction of rotation of phasors.

(PE/TR) C57.12.80-1978r

phase-sequence indicator A device designed to indicate the sequence in which the fundamental components of a polyphase set of potential differences, or currents, successively reach some particular value, such as their maximum positive value. *See also:* instrument. (EEC/PE) [119]

phase-sequence relay A relay that responds to the order in which the phase voltages or currents successively reach their maximum positive values. (SWG/PE) C37.100-1992

phase-sequence reversal A reversal of the normal phase sequence of the power supply. For example, the interchange of two lines on a three-phase system will give a phase reversal.

(IA/ICTL/IAC) [60]

phase-sequence reversal protection A form of protection that prevents energization of the protected equipment on the reversal of the phase sequence in a polyphase circuit.

(SWG/PE) C37.100-1992

phase-sequence test (rotating machinery) A test to determine the phase sequence of the generated voltage of a three-phase generator when rotating in its normal direction. *See also:* asynchronous machine. (PE) [9]

phase-sequence voltage relay (power system device function numbers) A relay that functions upon a predetermined value of polyphase voltage in the desired phase sequence.

(PE/SUB) C37.2-1979s

phase shift (1) The absolute magnitude of the difference between two phase angles. *Notes:* 1. The phase shift between two planes of a 2-port network is the absolute magnitude of the difference between the phase angles at those planes. The total phase shift, or absolute phase shift, is expressed as the total number of cycles, including any fractional number, between the two planes, where one complete cycle is 2π radians or 360 degrees. Relative phase shift is the total or absolute phase shift less the largest integral number of 2π radians or 360 degrees. The unit of phase shift is, therefore, the radian or the electrical degree. The term 2-port network is used in its most general sense to include structures of passive or active elements. This includes the case of a given length of waveguide but may also refer to any two ports of a multiport device, where it is understood that a signal is incident only at